

**A new subspecies of the Asiatic pit viper
Agkistrodon halys Pallas, 1776
(Serpentes, Viperidae)
from Afghanistan**

by

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The genus *Agkistrodon* is widely distributed in central Asia, but has so far been encountered from Afghanistan on only two occasions. Leviton & Anderson (1970) mentioned two specimens of *Agkistrodon* in the herpetological collection in Universitetets Zoologiske Museum in Copenhagen and which they believed were *A. halys* Pallas and *A. himalayanus* (Günther), respectively, due to the collecting localities. They originated from Sauzak Pass near Herat, northwestern Afghanistan and Wama (Nama), Nuristan, eastern Afghanistan. The "*halys*" specimen (ZMUC-R6912) showed after examination to be *A. intermedius caucasicus* Nikolsky and this is the easternmost known locality of this taxon (Gloyd & Conant, 1982). The "*himalayanus*" specimen appeared, after reexamination, to be a *Vipera lebetina* (L.) (Rasmussen, in litt.).

A second occurrence of *Agkistrodon* from Afghanistan was brought to my attention by Dr. Wolfgang Böhme, Zoologisches Forschungsinstitut und Museum A. Koenig in Bonn. Two specimens of *Agkistrodon*, one of which is deposited in the Museum (ZFMK) in Bonn, were collected by Prof. Ernst Kullmann in the Andarab Valley, province of Baghlan, eastern Afghanistan, at an altitude of 2500 m. These are the first known specimens of *Agkistrodon* from eastern Afghanistan and likewise the first confirmed record of *A. halys* from that country.

The taxonomic position of the different populations of *Agkistrodon* in central and eastern Asia has been confusing or contradictory during the past (e.g. Rendahl, 1933; Pope, 1935; Nikolsky, 1964; Terentev & Chernov, 1965; Lü, 1977; Zhao et al., 1979) with obvious difficulties in delimiting valid taxa. However, a recent series of revisions (Gloyd, 1972; 1977; Gloyd & Conant, 1982) have satisfactorily elucidated the systematics in this difficult group of pitvipers. In the light of these facts it is quite clear that the two specimens of *Agkistrodon halys* from eastern Afghanistan represent a geographically well separated and isolated population. As it is also morphologically distinct I hereby describe this taxon as:

Agkistrodon halys boehmei ssp.n.

Holotype. ZFMK 8648, adult female from Andarab valley, province of Baghlan, at 2500 m altitude, east Afghanistan. Collected by Ernst Kullmann, 1971. Figure 1.

Paratype. Zool. Museum Kabul University 2637 may be regarded as a paratype. It bears the same locality, date, and collector as the holotype. Some information on this specimen was provided by Dr. W. Böhme, Bonn, who had it in his care during 1972. Unfortunately the specimen had to be returned to the Kabul Museum the same year, and the snake subsequently has not been available for examination.

Diagnosis. Pattern consisting of dark lateral subcircular blotches, each one alternating with or opposite the corresponding blotch on the other side of the body. The blotches, about forty in number, extend only down to scale rows seven or eight laterally. At midbody scale rows are 23, apical pits absent. The holotype differs from female *A. h. cognatus* Gloyd by having a lower number of ventrals, subcaudals, and a relatively shorter tail; from *A. h. halys* in having a considerably lower number of ventrals and seven supralabials (normally eight in *halys*), and from *A. h. caraganus* (Eichwald) in having a smaller number of large dorsal blotches, seven supralabials (normally eight in *caraganus*) and the anterior nasal slightly larger than the posterior (about twice the size of posterior nasal in *caraganus*). From the central Asian subspecies of *A. intermedius* (Strauch) (*caucasicus* and *intermedius*) *boehmei* differs in the absence of apical pits and in having a pattern of lateral subcircular blotches.

Description of holotype. The arrangement of the head plates is similar to that of other subspecies of *A. halys*. Internasals wider than long, posteriormost corner on right side in contact with loreal. Anterior margin of prefrontals obtusely rounded. Frontal pentangular with anterior margin bluntly pointed and posterior corner penetrating weakly into a suture between the parietals. Supraocular twice as long as wide. Parietals one and a half time as long as wide. Upper margin of rostral about half as long (44 %) as the suture between rostral and anterior nasal. Anterior nasal about 1.3 times as large as posterior. Nostril in the suture between the nasals. One squarish loreal on each side, bordered above with the internasals and below with the prefoveals. Two pre- and two postoculars on each side. Upper preocular extending up to canthus rostralis, lower preocular forming posterior dorsal border of pit. Upper postocular small, lower extending below orbit, separated from lower preocular by third supralabial which is in broad contact with eye. Elongated postfoveal forming lower border of pit, separated from orbit. Three large lower temporals in one row, anterior largest. Upper temporals in one to three oblique rows. Seven supralabials on each side, third largest and in contact with eye. Eleven sublabials

on each side with first pair in contact behind mental. Anterior chinshields large, twice as long as broad.

Snout slightly raised. Dorsal scales, except lowermost row, strongly keeled on body and tail, without apical pits. Ventrals 2 + 153, anal 1, subcaudals 35/35 + 1 and scale reduction formula as follows:

$$\begin{array}{rcccl} 23 & \frac{-5(93)}{-5(86)} & 21 & \frac{-5(103)}{-5(106)} & 19 & \frac{-4(118)}{-5(115)} & 17(153) \end{array}$$

Total length 43.8 cm and tail 4.9 cm, which is equal to 11.2 % of total length.

Dorsal ground colour light grey with brown or brownish grey pattern on body and head. Markings on head typical of *A. halys* and containing a regular median brown bar across the supraoculars and frontal, a darker brown spot covers posterior parts of internasals and anterior and mesial parts of prefrontals. Dark oblique bands from posterior borders of supraoculars extend backwards across upper temporals and a second pair of bands run from posterior borders of parietals backwards, separated by a narrow greyish white stripe. These last markings constitute the start of the dorsal pattern. A uniform brown postorbital band extends from the lower postocular across the large lower temporals and backwards along the side of neck to level of fifth ventral. Above, this band is bordered by a light stripe which runs backwards from the upper postocular. A single dark spot covers the anterior nasal and first supralabial. Another dark spot covers the area between eye and pit. Rostral and the rest of the side of head, including lower half of posterior supralabials whitish with dark grey stippling. Mental and all sublabials externally with light central areas which are dark grey ventrally.

Pattern consists mainly of pairs of uniform brown lateral subcircular blotches, incompletely edged with black, and alternating with or opposite to corresponding blotch on the other side of body. Blotches in some cases are connected to form broad crossbands. The blotches are three to four scales wide laterally and extend down the sides to scale rows seven or eight. The greyish white areas that separate the blotches laterally and dorsally are about one scale wide. Forty-one blotches on each side of body and ten on tail. One lateral series of dark spots on scale rows four to six is a continuation from the dark temporal band and is sometimes united to form short longitudinal bands on body. A second lateral row of still darker spots runs on scale rows one and two and often overlaps the lateral edges of ventrals. Terminal spine on tail light brown. Throat and belly densely stippled with dark grey.

Variation. Nothing is known about the scalation in the single paratype, which has not been available for comparison. However, the pattern of ovoid alternating lateral blotches also occurred in that specimen. According to Böhme (in litt. 81-11-10), who had both snakes in his care during 1972, "the two speci-

mens were virtually identical in this respect”.

Remarks. The well developed pattern of alternating ovoid semicircles seems to be a morphological character with diagnostic value for this taxon. The pattern is similar to that occurring in *A. blomhoffii* Boie. The diagnostic significance of the scalation characters is, however, not possible to evaluate until more material of *A. h. boehmei* is available for study. The low number of ventrals

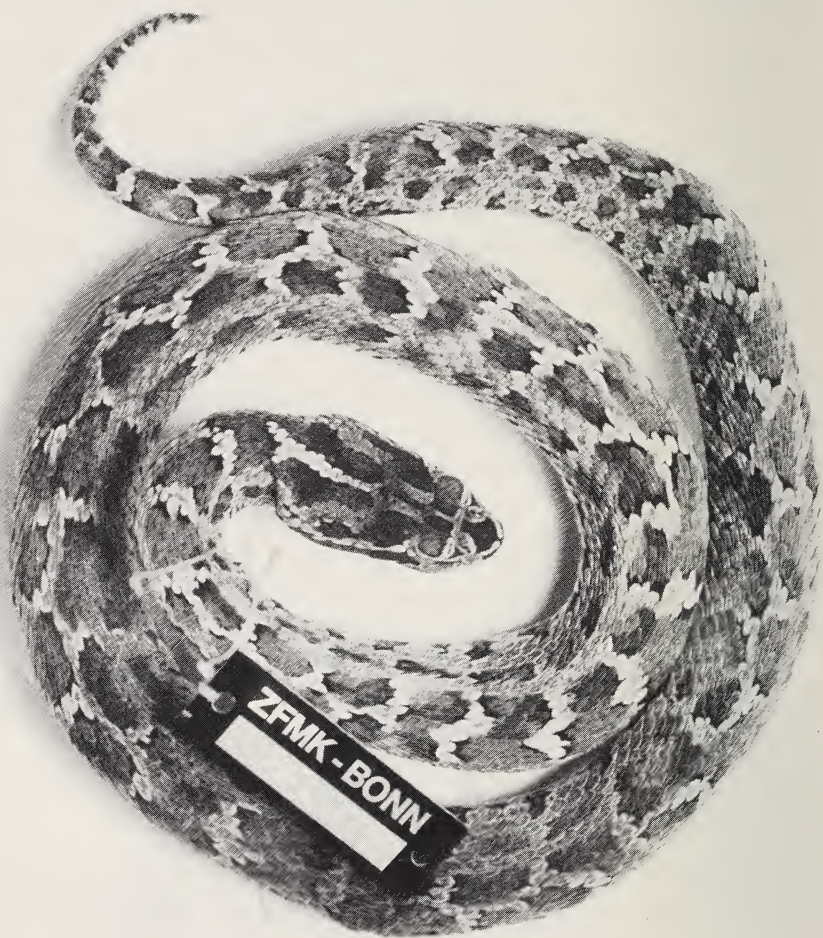


Fig. 1: Dorsal and ventral views of the holotype (ZFMK 8648) of *Agkistrodon halys boehmei*, ssp.n. — Photo Göteborg Natural History Museum (Håkan Berg).



(155) seems to separate it from *A. h. halys* (155–187, $\bar{x} = 166$) (Terentev & Chernov, 1965) as well as from females of *A. h. cognatus* Gloyd (156–165, $\bar{x} = 160.3$) (Gloyd, 1977). The latter subspecies also seems to have a higher subcaudal count in females (36–43, $\bar{x} = 40.3$) (Gloyd, 1977) compared to *boehmei* (35 + 1). The low number of subcaudals also seems to reflect a relatively short tail (11.2 % of total length) compared to females of *cognatus* for which Gloyd (1977) gives the range 11.6–13.5 ($\bar{x} = 12.7$ %) in text but 10.8–13.5 ($\bar{x} = 12.5$) in a table. The number of sublabials is normally ten in *cognatus* but eleven in the single *boehmei*. The number of supralabials is seven in both *boehmei* and *cognatus* but normally eight in *caraganus*. From *caraganus* it also differs in having a lower number of dorsal blotches, which are only one to two scale rows wide in *A. h. caraganus* but three to four scales wide in *A. h. boehmei*.

Discussion. The different populations of the polytypic species *A. halys* are distributed over a large area of central Asia. The known range of the species is divided into four different and widely separated regions. These are southern Siberia, USSR and Mongolia (*A. h. halys*); northern end of the Caspian Sea to eastern Kazakhstan and Kirgiziya, USSR (*A. h. caraganus*); Tsinghai and Kansu and perhaps Shansi in north central China (*A. h. cognatus*) (Gloyd & Conant, 1982) and finally *A. h. boehmei* from the Andarab valley in eastern Afghanistan. Of these four subspecies of *A. halys*, three (*halys*, *caraganus* and *cognatus*) seem to be distributed over larger areas, whereas *boehmei* so far is known only from the region of the Andarab valley. All four subspecies also seem to be well separated geographically from each other based on the literature and available specimens.

Much of the entire range of *A. halys* is also inhabited by the similar polytypic and closely related "sibling species" *A. intermedius* (Strauch) which likewise is lacking in most of Afghanistan as well as in adjacent USSR and China (Bannikov et al., 1977; Zhao et al., 1979; Gloyd & Conant, 1982). *A. intermedius* agrees with *A. halys* by also having 23 scale rows on midbody, but differs from *A. halys* by having paired apical pits on dorsal scales and relatively broader dark crossbands on body (Gloyd & Conant, 1982). *A. intermedius caucasicus* is the most closely distributed subspecies, with its main distribution in areas around the southern parts of the Caspian Sea. Besides the pattern and absence of apical pits, *A. h. boehmei* differs from *caucasicus* in having a dark belly, a dark central area of lateral blotches, and a light tail tip. *A. i. caucasicus* has a lighter belly, light central areas of the dark dorsal bands and dark tail tip. Furthermore, *caucasicus* normally has a lower number of dorsal bands (33–40, $\bar{x} = 36.5$) than *boehmei* (41), a broad upper margin of rostral (65–85 % of the suture between rostral and anterior nasal; 44 % in *boehmei*) and in having a comparatively small posterior nasal (about 50–70 % of anterior nasal; about equal in *boehmei*). *A. i. intermedius* has a higher ventral count (159–178; $\bar{x} = 169.4$) compared to *A. h. boehmei* (153).

Also closely related, but with allopatric distribution is *A. blomhoffii*, which, however, has apical pits and only 21 scale rows on midbody (Gloyd & Conant, 1982). Apart from *A. h. boehmei*, *A. blomhoffii* also differs from all forms of *A. halys* and *A. intermedius* by having paired dark blotches on the body.

Agkistrodon halys boehmei seems to be an isolated high alpine relict population from a formerly larger distribution of the species. Those parts of Asia are rich in isolated endemic taxa which often are remnants from earlier more extensive distributions (Anderson, 1968). The high alpine *Vipera latifii* Mertens, Darevsky & Klemmer in northern Iran is a parallel case within the same family of snakes. Within *A. halys* there are also marked different biogeographical distribution patterns. Both *A. h. halys* and *A. h. cognatus* occur in

areas (e.g. Pope, 1935; Gloyd, 1977; Rendahl, 1933) which are quite mountainous. This is also the case for *A. h. boehmei* (2500 m. altitude) while *A. h. caraganus* is restricted to areas between the northern Caspian Sea and lake Balchasj in USSR (Bannikov et al., 1977; Gloyd & Conant, 1982), which are plain lowland steppes. In this respect, *A. halys* is a parallel case to the Euroasian meadow vipers with *Vipera ursinii rakosiensis* Knoepffler & Sochurek and *V. u. renardi* (Christoph) as widely (or formerly so) distributed lowland steppe forms and with their alpine counterparts in *V. u. ursinii* (Bonaparte) subspecies-group and *V. u. ebneri* Knoepffler & Sochurek respectively.

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Summary

Agkistrodon halys boehmei ssp.n. is described from eastern Afghanistan. It is closely related to other subspecies of *A. halys* but differs in having a pattern of alternating semicircles on the body. The population is found at high altitudes (2500 m) and seems to be geographically well separated from other taxa of *Agkistrodon* in Central Asia. *A. h. boehmei* differs from *A. intermedius* in lacking apical pits and from *A. blomhoffii* in having 23 midbody scale rows.

Zusammenfassung

Eine neue Unterart der asiatischen Grubenotter *Agkistrodon halys* Pallas, 1776 (Serpentes, Viperidae) aus Afghanistan

Eine neue Unterart, *Agkistrodon halys boehmei*, wird aus dem Nordosten Afghanistans beschrieben. Sie unterscheidet sich von den anderen Subspezies der Art durch ein Muster alternierend angeordneter halbkreisförmiger Flecken auf dem Rumpf. Sie wurde in 2500 m Höhe gefunden und bildet offenbar eine Gebirgspopulation, die von den anderen *Agkistrodon*-Populationen Zentralasiens geographisch abgesondert ist. *A. h. boehmei* unterscheidet sich von *A. intermedius* durch das Fehlen apikaler Gruben auf den Dorsalschuppen und von *A. blomhoffii* durch den Besitz von 23 Schuppenreihen um die Körpermitte.

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